4165

DAMES & MOORE

20070424297

DISTRIBUTION UNLIMITED
For Public Release

FINAL STANDARD OPERATING PROCEDURE

Survey of Underground Storage Tanks and Other Subsurface Structures at the Umatilla Depot Activity Hermiston, Oregon

Prepared for:

U.S. Army Toxic and Hazardous Materials Agency
Aberdeen Proving Ground, Maryland
Contract No. DAAA15-88-D-0008, Delivery Order No. 3

DAMES & MOORE

7101 Wisconsin Avenue, Suite 700, Bethesda, Maryland 20814

July 1990

DAMES & MOORE A PROFESSIONAL LIMITED PARTNERSHIP
7101 WISCONSIN AVENUE, SUITE 700, BETHESDA, MARYLAND 20814-4870
(301) 652-2215 TELEX: 315528

July 25, 1990

U.S. Army Toxic and Hazardous
Materials Agency
Building E4435
Aberdeen Proving Ground, MD 21010

ATTN: CETHA-IR-A/Ms. Joan Jackson

Re: Final Standard Operating Procedure (SOP)
Survey of Underground Storage Tanks and
Other Subsurface Structures at the Umatilla
Depot Activity, Hermiston, Oregon
Contract No. DAAA15-88-D-0008
Delivery Order No. 3

Dear Ms. Jackson:

This letter transmits five (5) copies of the above-referenced SOP. It incorporates the comments of USATHAMA, which were transmitted on July 6, 1990.

With regard to USATHAMA Comment #8, note that the footnotes do appear in the table, although they are somewhat difficult to see. This table was taken directly from the Enhanced Preliminary Assessment.

In accordance with USATHAMA's comments, we understand that, due to finding limitations, the level of effort for this task is currently limited to revision of the SOP.

Please contact me if you have any questions or need additional copies of the SOP.

Sincerely,

DAMES & MOORE

Stephen Lemont
Project Manager

Enclosures

CONTENTS

CONTENTS (cont'd)

LIST OF ACRONYMS AND ABBREVIATIONS

BRAC	Base Realignment and Closure
COLIWASA	Composite Liquid Waste Sampler
CLASS	Contractor Laboratory Analytical Support Services
cm	centimeter
DERA	Defense Environmental Restoration Account
DOD	U.S. Department of Defense
EM	Electromagnetic
FID	Flame ionization detector
FSP	Field Sampling Plan
gal.	gallon(s)
GC	Gas chromatograph
IRDMIS	Installation Restoration Data Management Information System
NFPA	National Fire Protection Association
PA	Preliminary Assessment
PC	Personal computer
PID	Photoionization detector
POA	Plan of Action
PVC	Polyvinyl chloride
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
RI/FS	Remedial Investigation/Feasibility Study
SOP	Standard operating procedure
TCD	Thermal conductivity detector
TH	Total hydrocarbons
UMDA	Umatilla Depot Activity
USACE	U.S. Army Corps of Engineers
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
UST	Underground Storage Tank

1.0 INTRODUCTION

1.1 BACKGROUND

This document is the Standard Operating Procedure (SOP) for the performance of a survey of underground storage tanks (UST) and other subsurface structures at the Umatilla Depot Activity (UMDA), Hermiston, Oregon. This plan has been prepared under Contract No. DAAA15-88-D-0008, Delivery Order No. 3, for the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) in support of the U.S. Department of Defense (DOD) Base Realignment and Closure (BRAC) Program at UMDA. This project is being performed in conjunction with, though not as part of, the Remedial Investigation/Feasibility Study (RI/FS) of UMDA. The Army needs to determine--prior to base closure and property excessing--if any USTs are leaking or have leaked, thereby releasing contaminants to surrounding soils and possibly groundwater, and if other subsurface structures exist that may be potential contamination sources or potentially providing conduits for contaminant migration.

This SOP presents the technical approach for performance of the UST/subsurface structure survey at UMDA. It includes the methodologies and procedures that will be followed in identifying and locating USTs and other subsurface structures, performing leak testing of the tanks, and performing sampling investigations, as necessary.

1.2 OBJECTIVES AND SCOPE OF WORK

As identified by USATHAMA, the objectives of the UST/subsurface structure survey at UMDA are to:

- Identify, locate, and characterize (i.e., describe and qualitatively evaluate) subsurface structures that may be a source of or provide a conduit for contamination. These structures may include USTs, sumps, septic tanks, sewer lines, etc.
- Perform additional investigations at USTs including--in addition to location/identification--leak testing to determine tank integrity (where

possible), soil sampling in areas where leaks may have occurred, and identification of remedial alternatives.

The objectives listed above will be accomplished through performance of the following tasks, each of which is detailed in sections that follow. The logical approach to the performance of these tasks is shown schematically in Figure 1.

- Identification, location, and preliminary characterization of USTs and other subsurface structures, through conduct of historical records review and air photo interpretation, personnel interviews, geophysical surveys, and field reconnaissance, as necessary.
- Sampling and analysis of UST contents of unknown composition, to assist in evaluating approaches for field safety, leak testing, soil sampling/analysis, remedial action, and disposition of tank contents.
- Conduct of leak testing of USTs, where feasible, to determine tank integrity. This will include integrity testing of the approximately 95 existing USTs at UMDA. Soil gas sampling may be conducted in lieu of leak testing where leak testing is not possible.
- Conduct of soil gas sampling at UST locations where leaks may have occurred, for preliminary evaluation of the extent of soil contamination and development of preliminary soil sampling programs.
- Conduct of preliminary soil sampling around USTs where leaks may have occurred, to confirm the presence or absence of contamination, attempt determination of the lateral and vertical extent of contamination, and evaluate the need and alternatives for remedial action.
- Provision of recommendations for additional investigation and a preliminary discussion of remedial action alternatives, where needed.

Aside from USTs, the subsurface structures survey will focus on those structures that contain or contained wastes and may have leaked (e.g., sumps, septic tanks, sewer lines, other pipelines), as well as structures located near known or suspected contamination sources (such as RI/FS study sites) that may provide

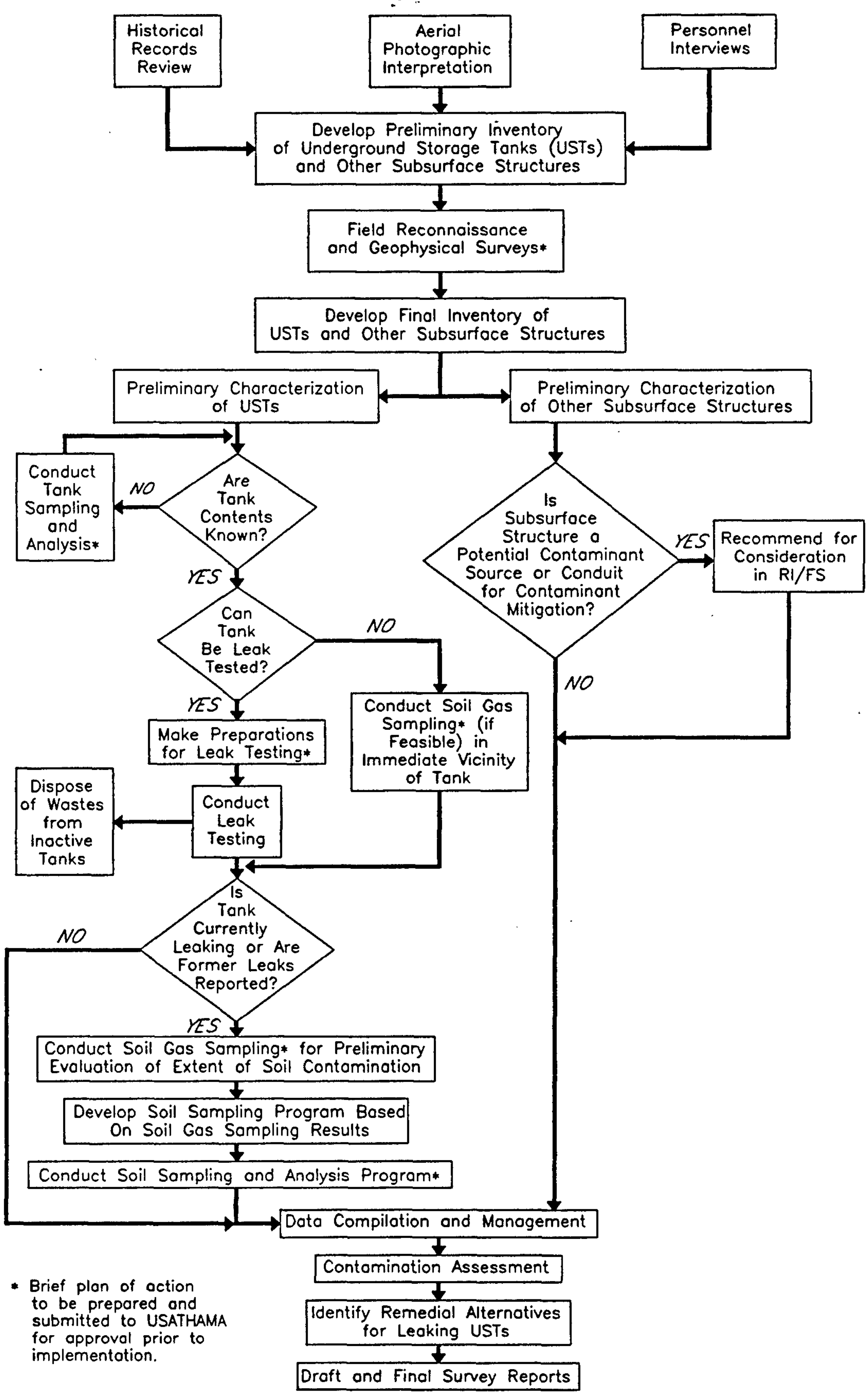

FIGURE 1
WORK FLOW DIAGRAM
SURVEY OF UNDERGROUND STORAGE TANKS AND OTHER SUBSURFACE STRUCTURES
UMATILLA DEPOT ACTIVITY, HERMISTON, OREGON

Dames & Moore

conduits for contaminant migration from such sources (e.g., along the bedding material of sewer lines and other underground pipes and utility lines). Note that sumps and septic tanks that are identified will not be included in the subsequent additional investigations of USTs; investigation of sumps andseptic tanks, where needed, is part of the RI/FS. Furthermore, the present scope of work, as specified by USATHAMA, includes plan preparation only and as such does not include leak testing, soil sampling, or any other investigations at subsurface structures other than USTs that have been identified, located, and characterized as part of this survey.

2.0 TECHNICAL APPROACH

2.1 IDENTIFICATION, LOCATION, AND PRELIMINARY CHARACTERIZATION OF SUBSURFACE STRUCTURES

2.1.1 Overview

Underground structures at UMDA will be identified, located, and characterized through a process of records review and field survey consisting of:

- Historical records review
- Aerial photographic interpretation
- Personnel interviews
- Field reconnaissance
- Geophysical surveys.

As shown in Figure 1, the first three steps are performed in conjunction with each other to develop a preliminary inventory of known and potential subsurface structures. Field reconnaissance is then performed to visually verify each known or potential location and to note important physical features. Geophysical surveys will be conducted to supplement visual inspections, to confirm locations of structures for which there may be no surface evidence, and to find suspected structures for which no documentation of location may be available.

The above process will result in the development of a complete and accurate inventory of USTs and other subsurface structures. For each structure, the inventory will include mapped location and descriptive information such as type of structure, function, location coordinates, age, size, contents, construction material, physical condition, presence of protective coatings or cathodic protection, status (i.e., active or inactive), known leaks/spills, evidence of leakage or leak potential, potential to act as a conduit for contaminant migration, etc., as appropriate for the particular types of structures.

2.1.2 Historical Records Review and Personnel Interviews

Available records and other pertinent information obtained from UMDA, USATHAMA, the U.S. Army Corps of Engineers (USACE), and other sources will be reviewed to locate, identify, and characterize subsurface structures. It is assumed that UMDA plant drawings will be available for use in locating sewers/sewer lines and other utility lines. The facility engineer, as well as other appropriate present and retired personnel, will be interviewed with respect to knowledge of and operations and potential spills/leaks at USTs, sumps, sewers, etc.; previous locations of gasoline stations/buildings; possible contents/use of tanks; USTs that have been removed/replaced; and other relevant information. Note that some of this work has already been done as part of the Enhanced Preliminary Assessment (PA) of UMDA conducted by Dames & Moore and as discussed below, a large body of information is presently available on USTs.

In 1989, the USACE, Omaha District, conducted an investigation and evaluation of USTs at UMDA.* The primary objective of this investigation was to identify USTs in need of remedial action and to evaluate and qualify each tank as eligible or not eligible for Defense Environmental Restoration Account (DERA) funding. A total of 81 USTs were inventoried in this investigation, which consisted of a site visit to each UST, compilation of UST data (e.g., tank status, date of installation, tank material, contents, size, sketch of location, evidence of past/current leaks/spills, contamination of environmental media), compilation of installation soils data, and location of each UST on the installation.

Of the 81 inventoried tanks, 19 were identified as septic tanks. (As mentioned earlier, septic tanks will be investigated in the RI/FS.) Also, although 14 tanks were identified by USACE as regulated tanks that are required to have leak testing performed, the investigation did not involve tank leak testing. The USACE investigation also did not involve analysis of the contents of USTs, soil sampling, or geophysical investigations to identify additional USTs.

During the PA site visit conducted by Dames & Moore in January 1990, 33 additional USTs were identified. For these tanks, as well as those identified by USACE, the PA identified or confirmed such information as tank number and

*U.S. Army Corps of Engineers, Omaha District, September 1989. Investigation and Evaluation of Underground Storage Tanks, Umatilla ADA, Hermiston, Oregon, prepared for U.S. Army Corps of Engineers, Huntsville Division.

location, tank status (active or inactive), approximate year of installation, estimated volume, tank contents, and construction materials (see Attachment A).

2.1.3 Aerial Photographic Interpretation

As part of RI/FS project plan development and conduct of the Enhanced PA, historical aerial photographs were reviewed to aid in locating previous gasoline stations or similar activities which may have had underground tanks. This information will be incorporated in the subsurface structures survey. However, the review of aerial photographs indicated that lesser evidence of USTs, such as fill pipes, is difficult to identify and that a general review of aerial photographs will not prove useful in identifying areas in which underground tanks or other subsurface structures may be present. The sandy nature of the soil at UMDA does not lead to pooling above leaking tanks as may be observed in a more clayey soil. Therefore, areas of soil staining or pooling of contaminants above the tanks, if any, would not be evident in UMDA aerial photographs. Nevertheless, air photograph interpretation may prove useful in this survey for narrowing down the specific locations of USTs if the general areas of the tanks are known.

2.1.4 Field Reconnaissance

In conjunction with the records review, personnel interviews, aerial photography interpretation, and geophysical surveys, a field reconnaissance will be conducted to positively locate and identify all subsurface structures that were identified at UMDA. This will include locating fill pipes, vent pipes, etc.; verifying/amending the location of subsurface structures on maps; visually assessing for spills/leaks; visually assessing concrete sumps and other subsurface structures for cracks (where possible); etc.

2.1.5 Geophysical Surveys

Surface geophysical surveys--using electromagnetics (EM) and magnetometry--will be performed, where needed, to locate or confirm the locations of USTs and other subsurface structures. Note that prior to implementation of the geophysical surveys, Dames & Moore will prepare and submit to USATHAMA for approval a brief, written plan of action (POA) which will outline the scope of recommended geophysical activities. The POA will include such information as locations/areas to be investigated, sizes of areas to be surveyed, grid spacing, survey rationale, and schedule for completion.

EM measures apparent conductivity of the soil by utilizing the principles of electromagnetic induction. Equipment for the EM survey will consist of a Geonics EM-31DL, which is an EM survey instrument with direct readout in terrain conductivity, and the Polycorder digital data logger. The EM-31DL has an intercoil spacing of 12 feet. In the vertical dipole configuration, it can locate buried structures at an effective depth of approximately 20 feet. Coupled with the Polycorder digital data logger, the EM-31DL provides for simultaneous measurement of the quadrature and inphase component of the induced magnetic field. The quadrature component provides the measure of conductivity. The inphase component provides enhanced meter responsiveness to buried metallic objects. EM field readings will be obtained with the instrument oriented both parallel and perpendicular to the line of survey traverse. Data will be downloaded to a personal computer (PC) from the Polycorder and will include the quadrature and inphase components, line number, and station.

As a check for the EM survey, a magnetic survey will also be performed. Equipment for the magnetometer survey will consist of an EDA OMNI-IV magnetometer, which is a microprocessor-based digital data acquisition system that allows for simultaneous measurement of total magnetic field intensity at two heights on a survey staff. This provides both magnetic intensity and vertical magnetic gradient data. The OMNI-IV permits automatic correction for temporal drift in the magnetic data by means of base station/tie-line readings. Data will be downloaded to a PC from field digital memory and will include station coordinates, time of readings, total field intensity, vertical magnetic gradient, and statistical reading error.

Both surveys are recommended because they can provide different types of data about buried objects. The EM instrument can accurately describe the shape of the object, while the magnetometer defines the depth of the object. Using just one of these surveys could allow some misidentification of the buried tanks/structures; however, because the two instruments work on different principles, using data from both surveys should allow accurate subsurface representation. Using the digital data files downloaded from the field units to the PC from both the EM and the magnetometer surveys, computer generated contour maps may be prepared using "SURFER" (Golden Software). Orthographic surface representations of the data may also be prepared using "SURFER" to assist in interpretation of the data.

The EM and magnetometer surveys will be conducted in areas identified from the historical records review/aerial photographic interpretation and personnel interviews as potential locations of subsurface structures/USTs (e.g., previous or current building sites where tanks are suspected of being located) that cannot otherwise be visually confirmed. A larger scale geophysical survey may be conducted at the former hospital complex/barracks in the administration area where USTs and sewer lines are suspected of being present. The EM and magnetometer surveys will permit the verification of tanks and/or former sewer lines that are suspected of being present, and will enable identification of specific locations of these structures.

It is currently estimated that EM and magnetometer surveys will be performed over a total of approximately 50 acres using 10- to 15-foot grid spacings. Should information indicate that a much larger area should be surveyed, grid spacings may initially be increased up to 100 feet, which would allow for a rough survey of a large tract of land. This would be followed by more intensive surveys (i.e., at 10- to 15-foot grid spacings) in those areas where initial readings indicate the possible presence of subsurface structures.

2.2 ADDITIONAL UST INVESTIGATIONS

2.2.1 Overview

2.2.1.1 Work Scope. Additional characterization of USTs will be performed by conducting additional investigations. These investigations are:

- Collection of samples for chemical testing from all tanks whose present or former contents are unknown. Sample analysis results will assist in evaluating subsequent leak testing and/or soil gas and possible soil sampling approaches, as well as requirements for disposition of tank contents and field safety.

- Precision (leak) testing of all identified USTs, where feasible, to determine tank integrity.
- Soil gas sampling (where feasible)--at all identified UST locations where leak testing is not possible--to obtain evidence of possible leaks/spills, and for preliminary evaluation of the extent of soil contamination and development of preliminary soil sampling programs at all locations of known or suspected leaks.
- Limited soil sampling around all USTs that are known or suspected to have leaked--based on historical reports, visual evidence, or leak testing or soil gas sampling results--to determine the presence or absence of contamination and the need for additional investigation and remediation.

2.2.1.2 Plans of Action. Prior to implementing each of the investigations identified in Section 2.2.2.1, Dames & Moore will inform USATHAMA--in the form of brief, informal written POAs--of the scope of each and seek concurrence before proceeding. For each investigation, these POAs will provide the following types of information:

Investigation	Types of Information to be Provided in POA
Tank Sampling	• Number and locations of tanks to be sampled. • Tank sample analysis parameters. • Rationale for tank sampling and analytical parameters.
Leak Testing	• Number and locations of tanks to be leak tested. • Any special requirements associated with leak testing (requirements for filling prior to testing, plumbing modifications, modification of area operations, etc.)
Soil Gas Sampling	• Number and locations of tanks at which soil gas sampling is proposed.

Investigation	Types of Information to be Provided in POA
	• Rationale for soil gas sampling.
	• Scope of the investigation (e.g., approximate size of area(s) to be sampled, grid spacing, number of samples, any special analytical parameters).
Soil Sampling	• Number and locations of tanks at which soil sampling is proposed.
	• Sample locations and depths.
	• Soil sample analysis parameters.
	• Rationale for soil sampling and analytical parameters.

In addition, the POAs will include schedules for planned field activities, chemical analysis (where applicable), data management, data evaluation, and report preparation (see Section 5.0).

As discussed in Section 2.1.5, a POA will also be submitted for approval for the geophysical surveys prior to their implementation.

2.2.2 Tank Sampling

Sampling of tank contents is proposed where tank contents are unknown. It is estimated that there are fewer than 10 USTs at UMDA that will require such sampling. One reason for the need for such sampling is to assist in the determination of the feasibility of leak testing because leak testing cannot be conducted where acidic or otherwise corrosive liquids are present. In such cases, liquids would need to be removed prior to testing. In addition, tank sampling results would provide an indication of the parameters to be analyzed in any subsequent soil gas sampling or soil sampling, if needed. Knowledge of task contents will also assist in determining the means of disposing of tank contents.

Samples from tanks will be collected using a glass or Teflon Composite Liquid Waste Sampler (COLIWASA), as described in Attachment B. The COLIWASA is very useful in cases where multiple liquid phases are present, although it is equally applicable to single-phase sampling. In all cases, sampling will be conducted prior to leak testing (see Section 2.2.3). Samples will be analyzed for suspected contents--e.g., petroleum hydrocarbons, acids, bases, heavy metals, volatile organic compounds, base-neutral and acid extractible organic compounds, pesticides--as appropriate.

One sample will be collected from each tank identified for sampling, over the entire vertical thickness of the liquid. Sample collection at more than one location would not be possible in USTs with restricted access. It will be assumed that the horizontal composition of tank contents is uniform and that multiple phases of uniform thickness exist in the vertical direction. Where multiple liquid phases are found to exist in a tank, phases will be separated in the laboratory, as appropriate, and analyzed separately. If solids or heavy sludges are encountered, alternate sampling approaches will be considered on a case-by-case basis.

Other field procedures related to sampling, decontamination, recordkeeping, chain-of-custody, etc., are presented in Appendix E of the Field Sampling Plan (FSP, Part B) of the UMDA RI/FS Project Plan. Additional information relevant to field and laboratory equipment and procedures is presented in Section 2.2.6.

2.2.3 Leak Testing

2.2.3.1 Proposed Method. Where feasible tank leak testing will be performed by an independent precision tank testing contractor under the supervision of Dames & Moore. It is currently planned to use the services of a contractor who will employ the Homer Ezy-Chek Detection Equipment and System for tank precision testing. The Ezy-Chek Method performs leak detection based on temperature and volume and the theoretical coefficient of expansion and their relationship to each other. The Ezy-Chek Method meets or exceeds all State, Federal, and National Fire Protection Association (NFPA) requirements.

The method involves a temperature probe consisting of platinum sensing wires encased in a coil spring of special plastic tubing. When the weighted probe is lowered into a tank ranging in size from 2 to 20 feet in diameter, it proportions the volume of the tank and can accurately detect average temperature change (to 0.001°F), if any, when the product is stratified. In addition, low pressure air flows from an air supply tank to the bellows which, in turn, are connected to a plastic tube which is inserted into the top of product to cause a bubbling action. A pen recorder connected to the bellows monitors the head pressure of the product. If the product is expanding, it will take more pressure to cause the bubbling action, which will move the pen up the chart; if the volume level decreases, a decrease in pressure needed for bubbling action will cause the pen to move down the chart. The actual volume change is calculated using the head pressure change and the volume change due to temperature. In most cases, an average hourly volume change over 2 to 3 hours is recorded.

2.2.3.2 Applicability to UMDA USTs. The Ezy-Chek System is applicable to tanks made of metal construction materials--e.g., iron, steel. Satisfactory results may not be obtainable with concrete containments because concrete has not proved to be a tight containment vessel and may produce variable temperature readings and inconsistent results. Thus, concrete tanks will not be tested. Also, the method is applicable to virtually all liquids (diesel fuel, gasoline, used oil, water, etc.) except acidic or otherwise corrosive liquids, which might damage the test equipment. Thus, knowledge of tank contents is essential prior to testing. Furthermore, tanks must have a fill pipe with a removable drop tube. Tanks with a manway and no fill pipe may be tested, depending on the specifications of the tank, by closing off the manway and inserting a fill tube. Some USTs may be unsatisfactory for tank leak testing due to damage or tank construction properties (e.g., the USTs may not be tilted from horizontal). The Ezy-Chek Method is most applicable to USTs up to approximately 50,000 gallons (gal.), although 50,000-gal. tanks must be monitored for 24 hours rather than the 2 to 3 hours applicable to smaller tanks.

Noting the various considerations regarding test method applicability, as well as potential special preparation requirements (see also Section 2.2.3.3.1), it is recommended that the tank testing contractor view all tanks and provide input regarding leak testing to the tank leak testing POA prior to implementation of field testing.

2.2.3.3 Precision Testing Procedure

2.2.3.3.1 Tank Preparation. Prior to tank testing, the following preparations will be made. Careful coordination with and assistance from UMDA will be required for all steps; specific requirements will be detailed in the tank leak testing POA.

- Fill tanks at least 12 hours prior to testing, within 6 inches of the top of the fill tube. An exception is for tanks of approximately 50,000 gal. or larger, which must be filled for 1 week prior to testing to allow for stabilization. Tanks between approximately 25,000 and 50,000 gal. may also need several days to stabilize. Active tanks should be filled with the product in storage (e.g., diesel fuel, heating oil, gasoline). Inactive tanks may be filled with water after any residual liquids are first pumped out, because integrity testing cannot be performed on tanks containing more than one fluid type.
- Have available 35 gallons of similar product at each tank.
- If the drop tube is immobile (i.e., not easily removable), a plumber may be required to loosen it.
- Schedule for a 3-hour test for most tanks, up to 24 hours for tanks of 25,000 to 50,000 gallons or larger. During this period, access must be allowed and there can be no heavy equipment movement within 20 feet of the tank.

2.2.3.3.2 Tank Testing. It is planned to use the services of a contractor who will conduct the leak tests using the EZY-Chek Method over periods of approximately 2 to 24 hours per tank depending on tank capacity. During testing, conditions described in Section 2.2.3.3.1 must be present.

2.2.3.3.3 Post-Testing Procedures. Liquids remaining after the leak testing of inactive tanks will be treated as hazardous waste and will be removed following tank testing by a waste management contractor. These liquids include residual product pumped from USTs prior to testing and any water that may have been added allow for testing, then pumped out for disposal. Liquids will be pumped into tanker trucks to be provided by the waste management contractor.

2.2.4 Soil Gas Sampling

Where feasible, soil gas sampling will be conducted at USTs where leak testing is not possible, and will also be used to evaluate the extent of contaminant migration if leakage has occurred. It is noted, however, that soil gas sampling may detect contamination from previous leaks of old tanks that have since been replaced, or contamination resulting from surface spills rather than leaks; thus, the results may indicate contamination from sources other than a leak from an existing UST. Therefore, the soil gas data will be used in conjunction with available historical information (e.g., was tank replaced?; did former tank leak?; was soil excavated and disposed of if former tank leaked?; etc.) before concluding that a tank is currently leaking.

Soil gas samples will be collected on a grid in the vicinity of the UST. The size of the grid and the sample spacing will vary based on such factors as the size of the UST, visual information concerning its leak potential, and period of known leakage. The grid spacing should allow adequate resolution of the source area and boundaries of any expected zones of contamination. For example, a preliminary soil gas survey to determine if a tank may have leaked might involve up to approximately 12 sample locations immediately surrounding the tank. To evaluate the extent of soil contamination from leaking tanks, soil gas samples might initially be collected on a 25- to 50-foot core grid, but may be adjusted in the field as data are acquired, plotted, and evaluated. More closely spaced samples and possible additional samples over larger areas may be collected to better delineate zones of contamination and contaminant migration patterns.

It is planned to use the services of a soil gas contractor who will analyze the samples in the field as they are collected. Additional QA/QC samples of ambient air will also be collected in the course of the survey. The results of soil gas surveys will be discussed with USATHAMA during the collection and evaluation process.

The specific soil gas survey methodology for tanks containing petroleum hydrocarbons is as follows. For tanks containing other types of volatile constituents, analytical parameters will vary. Soil gas sampling is not applicable at tanks containing only semivolatile or non-volatile constituents.

- Soil gas samples will be collected by extracting soil gas from the subsurface by vacuum through a small-diameter, hollow metal rod, which will be pneumatically driven into the ground a distance of approximately 3 feet. Where necessary, approximately 1-inch-diameter holes will be drilled through asphalt or concrete to provide access to the subsurface. All holes will be repaired by filling the hole with sand to within a few inches of the surface, and then filling the remainder of the hole with concrete.

- Soil gas samples will be analyzed in the field at the time of sample collection using a gas chromatograph (GC) equipped with a flame ionization detector (FID) and a thermal conductivity detector (TCD).

- The FID is intended to detect benzene, toluene, xylenes, ethylbenzene, and the C_1 through C_{16} hydrocarbons. Generally, individual hydrocarbons in the C_1 through C_{16} range may not be present at high enough concentrations to be individually reported; however, the sum of the individual hydrocarbon concentrations will be reported as total hydrocarbons (TH). TH is the most important parameter for detecting subsurface vapor related to hydrocarbon fuels.

- The TCD detector will be used to detect methane and carbon dioxide, which are hydrocarbon biodegradation products. The occurrence of methane and carbon dioxide often correlates well with the fringe of the zone of contamination, because it is here where biological activity is often prevalent. Such testing is also useful for old spills in which much of the original fuel product may have degraded.

- A photoionization detector (PID) will not be used, because it is insensitive to the C_1 through C_{16} hydrocarbons, which make up TH. The PID is more sensitive to the aromatic fuel fraction (benzene, toluene, xylenes, ethylbenzene); however, this advantage is more than offset by the inability of the PID to detect C_1 through C_{16} hydrocarbons.

Further discussion of the soil gas sampling/analysis and associated quality assurance/quality control (QA/QC) procedures is provided in Section 7.0 of the Quality Assurance Project Plan (QAPP), Part C of the UMDA RI/FS Project Plan.

2.2.5 Soil Sampling Investigations

Based on the results of the tank leak testing program and soil gas sampling, areas of potential soil contamination will be identified, and soil sampling/analysis will be conducted, as necessary. Soil sampling may be conducted at USTs that are identified as leakers and in areas where soil gas sampling indicates potential contamination.

The number, locations, and depths of soil borings and the number of samples to be taken at each location will be determined on a site-specific basis. Factors that will be taken into account in determining these study elements include depth of tank, severity of suspected leak, duration of suspected leakage, mobility of suspected contaminants, and extent of contamination based on soil gas sampling results. It is anticipated that two to four borings of 10- to 15-foot depth, sampled at 2-foot intervals, may be adequate for preliminary evaluation of soil contamination in the immediate vicinities of the USTs suspected of leaking. Samples for chemical analysis would be selected based on visual observation, odor, and/or field PID readings. Additional sampling locations may be placed in zones of potential contamination identified from soil gas sampling. Although guided by the soil sampling POA, the final determination of the boring depths, locations, and number of samples will be left to the judgement of the sampling crew. Soil samples will be analyzed for the suspected contaminants that may have leaked from the tanks. Sample locations will be staked, measured from existing structures (e.g., building corners, tank fill pipes), and plotted on appropriate installation maps. Additional information on sampling and chemical analysis procedures is presented in Section 2.2.6.

2.2.6 Field and Laboratory Equipment and Procedures for Tank and Soil Sampling

This section provides additional information on field and laboratory procedures for tank and soil sampling. With the exception of the tank sampling procedure presented in Attachment B, complete descriptions of field equipment and of sample collection, sample handling, chemical analysis, and QA/QC procedures are presented in the UMDA RI/FS Project Plan documents--specifically the FSP (Part B) and the QAPP (Part C). Also, work will be conducted in accordance with safety procedures presented in the Health and Safety Plan (Part D) for the RI/FS.

Among the samples to be collected, no field QC samples (e.g., equipment rinseate blanks, duplicates, trip blanks) are planned. Analysis of water used for decontamination purposes will be conducted as part of the RI/FS.

Samples will be shipped to the USATHAMA contractor laboratories for analysis using USATHAMA-certified or other USATHAMA-approved methods under the Contractor Laboratory Analytical Support Services (CLASS) Program.

3.0 DATA MANAGEMENT AND EVALUATION

3.1 DATA COMPILATION AND MANAGEMENT

Data collected during the subsurface structures inventory stage of the project will be tabulated to clearly present information on structure locations, descriptions, and the relevant characteristics. Information presented in the geophysical, leak testing, and soil gas sampling reported will be incorporated to complete the inventory.

Tank and soil sample analysis data generated in this program--which comprise sampling locations and chemical analysis results--will be entered into the USATHAMA Installation Restoration Data Management Information System (IRDMIS) in accordance with the approach described in the Contract Data Management Plan, Appendix B of the UMDA RI/FS Work Plan (Part A). Sampling site IDs and map coordinates will be entered by Dames & Moore; entry of chemical analysis results and associated QA/QC data will be the responsibility of the CLASS contractor laboratories. Upon completion of data management activities by Dames & Moore and the labs and elevation of the data to Level 3 of the IRDMIS by USATHAMA, the data will be accessed by Dames & Moore and printed in tabular form by UST locations for use in data evaluation.

3.2 DATA EVALUATION

3.2.1 Contamination Assessment

Information obtained during the records review, visual inspection, leak testing, and tank sampling will be reviewed in conjunction with the soil gas and soil sampling data to identify specific USTs which are determined to be leaking or have previously leaked and subsurface structures that may be providing a conduit for contamination or may themselves be contaminant sources.

The soil sampling data will be used to quantify, to the extent possible, the extent of soil contamination, if any, at each UST with respect to areal extent, depth, and concentrations. Due to the limited soil sampling that may be conducted during the initial soil sampling investigation, additional soil sampling may be recommended to enable a complete characterization of the extent of soil contamination at each UST. Furthermore, installation of monitoring wells and groundwater sampling may be recommended if results of this survey suggest that leaking USTs may have contaminated groundwater. In addition, information on subsurface structures may be used to modify or add field programs in the RI/FS.

3.2.2 Remedial Alternatives

Data evaluation will also include preliminary identification of potentially applicable remedial action alternatives at leaking USTs. The need for remediation will be triggered by concentrations in soil in excess of potential action levels.

Initially, a comprehensive set of alternatives will be identified, each of which is applicable to one or more USTs at UMDA. Then, the applicability of the individual alternatives to each UST and vicinity will be determined (based on such factors as contaminant type, total contaminant concentration, size and configuration of affected area), and site-specific effectiveness, implementability, and order-of-magnitude costs will be briefly described. Tabular presentations of much of this information are anticipated, especially if remediation activities at a large number of UST locations are needed. Obviously, the information on remedial actions that can be presented will be limited and based on several assumptions, because of the limited amount of information that this preliminary survey may provide on the extent of contamination.

4.0 REPORT

The primary technical deliverable for this preliminary assessment will be a Preliminary Underground Storage Tank and Subsurface Structure Survey Report, prepared in draft and final forms and incorporating the results of the present assessment and of previous investigations by the USACE and Dames & Moore. This report will include:

- Updated inventories and locations maps.
- A summary of geophysical survey procedures and results.
- Tabulation and evaluation of tank leak test, soil gas survey, and tank contents and soil sample analysis results.
- A brief discussion of remedial action alternatives.
- Recommendations for additional investigation.

Appendices will include the geophysical survey, tank leak testing, and soil gas sampling reports.

5.0 SCHEDULE

Dames & Moore can begin the office and onsite, pre-fieldwork records review, personnel interviews, aerial photographic interpretation, and field reconnaissance activities within approximately three weeks of USATHAMA and UMDA authorization to proceed. Considering the information already available and reviewed, these activities are expected to take approximately 2 to 3 weeks, after which geophysical surveys will be conducted if needed. There is insufficient information to determine the scope of and time required for geophysical activities at this time.

Any required tank sampling can begin immediately following the geophysical surveys. Tank testing may also begin at this time, although testing at tanks with unknown contents may need to be completed last after results of tank sampling are obtained. It is recommended that all soil gas sampling--for both leak evaluation and delineation of contaminated areas--be conducted following tank precision testing, so that all soil gas sampling can be conducted with a single subcontractor mobilization. Soil sampling investigations would be conducted following analysis of soil gas results.

Note that geophysical surveys, tank sampling, tank leak testing, soil gas sampling, and soil sampling activities will be implemented only after Dames & Moore submits and obtains USATHAMA and UMDA approval on associated POAs. For each facet of the program, POA preparation may require from 1 to 3 weeks, depending upon scope and complexity. The POAs will provide schedules for each field activity. Also, the soil sampling POA will provide the schedule for all survey data management/evaluation and draft and final report preparation activities.

Note also that geophysical survey, soil gas sampling, and soil sampling activities need not be conducted concurrently with similar RI field activities, although coordination of these activities with RI fieldwork, if feasible may result in cost savings due to reduced Dames & Moore and subcontractor mobilizations.

ATTACHMENT A

Existing Underground Storage Tank Information

Existing Underground Storage Tank Information

Tank Number	Plate Number/Area	Status (Active or Inactive)	Year Installed (Estimated)	Tank Volume (Estimated in Gallons)	Material Stored in Tank	Tank Construction Material	Source of Tank Information[a]
UST 1	7/Administration	Active	1945	1,000	DF2[b]	Steel	A
UST 2	7/Administration	Active	1945	1,000	DF2	Steel	A
UST 3	7/Administration	Active	1945	1,000	DF2	Steel	A
UST 4	7/Administration	Active	1945	1,000	DF2	Steel	A
UST 5	7/Administration	Inactive	1945	1,000	DF2	Steel	A
UST 6	7/Administration	Active	1945	1,000	DF2	Steel	A
UST 7	7/Administration	Inactive	1945	1,000	DF2	Steel	A
UST 8	7/Administration	Active	1945	1,000	DF2	Steel	A
UST 9	8/VI	Active	1945	3,000	DF2	Steel	A
UST 10	8/V	Active	1945	1,002	DF2	Steel	A
UST 11	8/III	Active	1945	15,194	HT5[c]	Steel	A
UST 12	8/III	Active	1945	2,500	DF2	Steel	A
UST 13	8/II	Active	1945	1,001	DF2	Steel	A
UST 14	8/II	Active	1965	1,000	DF2	Steel	A
UST 15	8/IV	Active	1982	4,006	DF2	Steel	A
UST 16	8/IV	Active	1982	6,008	DF2	Steel	A
UST 17	8/IV	Active	1965	10,310	DF2	Steel	A
UST 18	7/Administration	Active	1945	15,194	HT5	Steel	A
UST 19	7/Administration	Active	1945	8,000	HT5	Steel	A
UST 20	7/Administration	Active	1945	10,529	HT5	Steel	A
UST 21	7/Administration	Active	1945	15,194	HT5	Steel	A
UST 22	7/Administration	Active	1945	12,088	HT5	Steel	A
UST 23	7/Administration	Active	1945	12,088	HT5	Steel	A
UST 24	8/II	Active	1945	15,194	HT5	Steel	A
UST 25	8/VI	Active	1945	15,194	HT5	Steel	A
UST 26	7/Administration	Active	1945	675	DF2	Steel	A
UST 27	7/Administration	Active	1945	675	DF2	Steel	A
UST 28	7/Administration	Active	1945	675	DF2	Steel	A
UST 29	7/Administration	Active	1945	675	DF2	Steel	A
UST 30	7/Administration	Active	1945	375	DF2	Steel	A
UST 31	7/Administration	Active	1945	1,000	DF2	Steel	A
UST 32	8/II	Active	1945	1,000	DF2	Steel	A
UST 33	8/II	Active	1945	1,000	DF2	Steel	A
UST 34	7/Administration	Inactive	1945	1,000	DF2	Steel	A
UST 35	8/II	Inactive	1945	1,000	DF2	Steel	A
UST 36	8/II	Inactive	1945	10,310	DF2	Steel	A
UST 37	8/II	Inactive	1945	10,310	HT5	Steel	A
UST 38	8/II	Inactive	1945	10,310	HT5	Steel	A
UST 39	8/V	Inactive	1945	25,049	HT5	Steel	A
UST 40	8/II	Inactive	1945	1,000	DF2	Steel	A
UST 41	8/VII	Inactive	1945	10,310	Gasoline	Steel	A
UST 42	7/Administration	Active	1984	50,750	Gasoline	Steel	A
UST 43	7/Administration	Active	1984	50,750	DF2	Steel	A
UST 44	7/Administration	Active	1948	500	Waste oil	Steel	A
UST 45	7/Administration	Active	1942	500	Waste oil	Steel	A
UST 46	7/Administration	Inactive	1941	140	Gasoline	Steel	A
UST 47	8/II	Active	1950	110	Gasoline	Steel	A
UST 48	8/II	Active	1948	110	Gasoline	Steel	A
UST 49	8/II	Active	1946	110	Gasoline	Steel	A
UST 50	8/II	Active	1943	110	Gasoline	Steel	A
UST 51	7/Administration	Active	1945	1,000	DF2	Steel	A
UST 52	8/II	Inactive	1945	1,000	DF2	Steel	A
UST 53	8/V	Inactive	1945	1,000	DF2	Steel	A
UST 54	8/IV	Inactive	1984	Unknown	Chemicals	Concrete	A
UST 55	8/III	Active	1985	Unknown	DF2	Steel	A

Tank Number	Plate Number/Area	Status (Active or Inactive)	Year Installed (Estimated)	Tank Volume (Estimated in Gallons)	Material Stored in Tank	Tank Construction Material	Source of Tank Information[a]
UST 56	8/III	Inactive	1950	Unknown	Gasoline	Steel	A
UST 57	8/V	Inactive	1945	Unknown	DF2	Steel	A
UST 58	8/IV	Active	1982	Unknown	DF2	Steel	A, C
UST 59	8/V[d]	Inactive	1945	3,000	Gasoline or DF2	Steel	A, B, C
UST 60	8/V[d]	Inactive	1945	3,000	Gasoline or DF2	Steel	A, B, C
UST 61	8/V[d]	Inactive	1945	3,000	Gasoline or DF2	Steel	A, B, C
UST 62	8/V[d]	Inactive	1945	3,000	Gasoline or DF2	Steel	A, B, C
UST 63	7/Administration	Active	1980s	500	Battery acid	Steel	B
UST 64	7/Administration	Inactive	Unknown	900	Diesel	Unknown	B
UST 65	7/Administration	Inactive	Unknown	800	Diesel	Unknown	B
UST 66	7/Administration[e]	Inactive	1950s	700	High octane gasoline	Unknown	B
UST 67	7/Administration[e]	Inactive	1950s	10,500	Gasoline	Unknown	B
UST 68	7/Administration[e]	Inactive	1950s	10,500	Gasoline	Unknown	B
UST 69	7/Administration[e]	Inactive	1950s	10,000	Gasoline or DF2	Steel	B
UST 70	7/Administration[e]	Inactive	1950s	10,000	Gasoline or DF2	Steel	B
UST 71	7/Administration[e]	Inactive	1950s	10,000	Gasoline or DF2	Steel	B
UST 72	7/Administration[e]	Inactive	1950s	10,000	Gasoline or DF2	Steel	B
UST 73	7/Administration[e]	Inactive	1950s	10,000	Gasoline or DF2	Steel	B
UST 74	7/Administration[e]	Inactive	1950s	10,000	Gasoline or DF2	Steel	B
UST 75	7/Administration[e]	Inactive	1950s	10,000	Gasoline or DF2	Steel	B
UST 76	7/Administration	Inactive	1950s	600	Diesel	Steel	B
UST 77	7/Administration	Inactive	1950s	800	Light oil	Steel	B
UST 78	7/Administration	Active	1950s	500	Boiler blowdown	Concrete or Steel	B
UST 79	7/Administration	Inactive	1950s	1,000	HT5	Steel	B
UST 80	7/Administration	Active	1950s	1,000	HT5	Steel	B
UST 81	7/Administration	Active	1950s	1,000	HT5	Steel	B
UST 82	7/Administration	Active	1950s	800	HT5	Steel	B
UST 83	7/Administration	Inactive	1950s	1,000	DF2	Steel	B
UST 84	7/Administration	Inactive	1950s	3,000	DF2	Steel	B
UST 85	7/Administration	Active	1950s	500	Boiler blowdown	Concrete or Steel	B
UST 86	7/Administration	Inactive	1950s	3,000	HT5	Steel	B
UST 87	8/II	Inactive	1950s	1,000	DF2	Steel	B
UST 88	8/V	Inactive	1950s	500	DF2	Steel	B
UST 89	8/V	Inactive	1950s	500	DF2	Steel	B
UST 90	8/V	Inactive	1950s	500	DF2	Steel	B
UST 91	8/V	Inactive	1950s	250	DF2	Steel	B
UST 92	8/V	Inactive	1950s	1,000	DF2	Steel	B
UST 93	8/V	Inactive	1950s	600	Boiler blowdown	Concrete	B
UST 94	71/VII	Active	1950s	500	Boiler blowdown	Concrete	B
UST 95	8/IV	Inactive	1960s	Unknown	Chemicals	Concrete	B, C

[a]Information sources: A (USACOE); B (former UMDA employees); C (current UMDA employees).

[b]No. 2 diesel fuel.

[c]No. 5 heating oil.

[d]Current and former UMDA employees report that some or all of these tanks may have been removed. See Site 43 description for more details.

[e]Current and former UMDA employees report that some or all of these tanks may have been removed. See Site 42 description for more details.

ATTACHMENT B

UST Sampling Using a Composite Liquid Waste Sampler (COLIWASA)

UST SAMPLING USING THE COMPOSITE LIQUID WASTE SAMPLER (COLIWASA)

Discussion

The COLIWASA is a much cited sampler designed to permit representative sampling of liquids and slurries from drums, shallow tanks, pits, and similar containers. It is especially useful for sampling wastes that consist of several immiscible liquid phases. The sampler is commercially available or can be easily fabricated from a variety of materials including polyvinyl chloride (PVC), glass, or Teflon. In its usual configuration, it consists of a 152-cm by 4-cm (inside diameter) section of tubing with a neoprene stopper at one end attached by a rod running the length of the tube to a locking mechanism at the other end. Manipulation of the locking mechanism opens and closes the sampler by raising and lowering the neoprene stopper.

A recommended model of the COLIWASA is shown in Figure B-1; however, the design can be modified and/or adapted somewhat to meet the needs of the sampler. The limited length (152 cm or 5 feet) of the COLIWASA may lead to a requirement of sampling tanks in stages; that is, if liquid depths are greater than 5 feet, sampling of the entire thickness of the liquid would involve sampling of the upper 5 feet, then of succeeding depths at 5-foot intervals. However, because of the possibility of encountering multiple liquid phases, it may be advisable to overlap sample intervals somewhat to avoid the possibility of missing a phase interface or a very thin liquid layer. When sampling below the uppermost interval, the COLIWASA should be opened only upon reaching the top of the desired sampling interval. Also, for most tank sampling applications, some type of extension pole and mechanism would be needed to lower/raise and open/close the sampler.

Uses

The COLIWASA is primarily used to sample most containerized liquids. The plastic COLIWASA is reported to be able to sample most containerized liquid wastes except for those containing ketones, nitrobenzene, dimethylforamide, mesityloxide, and tetrahydrofuran. A glass COLIWASA is able to handle all wastes

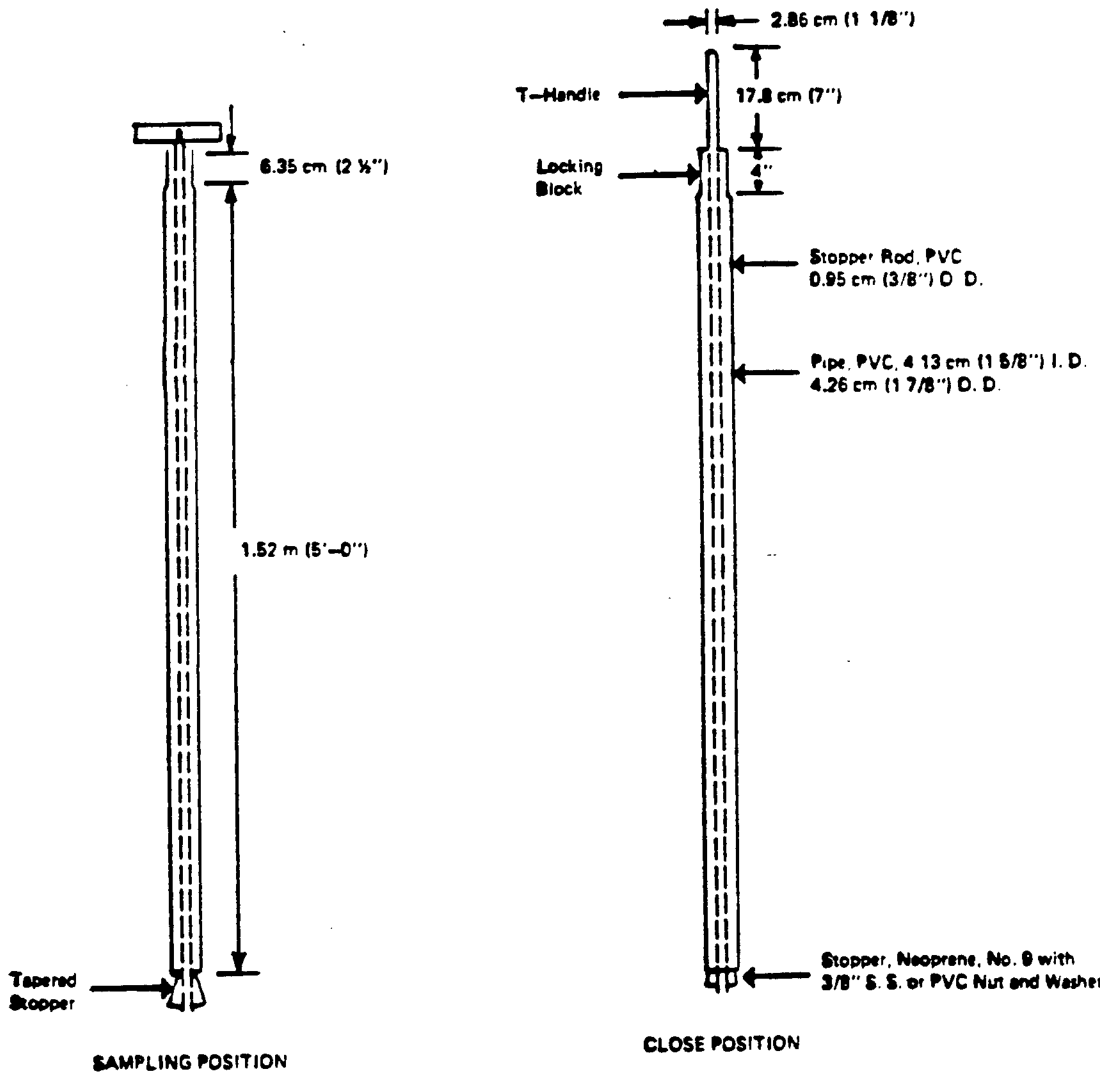

FIGURE B-1
COMPOSITE LIQUID WASTE SAMPLER (COLIWASA)

unable to be sampled with the plastic unit except strong alkali and hydrofluoric acid solutions. Due to the unknown nature of many wastes to besampled, it would therefore be advisable to eliminate the use of PVC materials and use samplers composed of glass or Teflon. Furthermore, glass and Teflon samplers are available in clear models which allow ease of viewing of multi-phase sampled waste.

Procedures for Use

1. Make sure that the sampler is clean prior to each use.

2. Check to make sure the sampler is functioning properly. Adjust the locking mechanism if necessary to make sure the neoprene rubber stopper provides a tight closure.

3. Upon reaching the top of the desired sample interval, open the sampler by placing the stopper rod handle in the T-position and pushing the rod down until the handle sites against the sampler's locking block.

4. Holding the sampler as true to vertical as possible, slowly lower it into the liquid waste at a rate that permits the levels of the liquid inside and outside the sampler tube to remain about the same. If the level of the liquid in the sample tube is lower than that outside, the sample rate is too fast and will result in a non-representative sample.

5. When the sampler stopper reaches the bottom of the desired sample interval or hits the bottom of the tank, push the sampler tube downward against the stopper to close. Lock the stopper in the closed position by turning the T-handle until it is upright and one end rests tightly on the locking block.

6. Slowly withdraw the sampler from the tank while wiping the sampler tube with a disposable cloth or rag.

7. Carefully discharge the sample into a suitable sample container by slowly pulling the lower end of the T-handle away from the locking block while the lower end of the sampler is positioned in the sample container.

8. Cap the sample container, attach label and seal, record in field logbook, and complete sample analysis request sheet/chain-of-custody record. Ship samples to the laboratory in a temperature-controlled chest at 4°C.

9. Before reusing the COLIWASA, clean it as follows:

   a. Remove nut and stopper at end of sampler, and stopper rod from sampler.

   b. Wash outer tube using a bottle washer brush attached to a pole, equal in length to the COLIWASA (allows entire tube to be washed).

   c. Equipment should be washed with warm water and laboratory detergent followed by rinsing with tap water (3 times) and a final rinse with distilled water.

   d. The sampler should then be dried, reassembled, and stored in a plastic bag or container.

<u>Sources</u>

Ford, P.J., P.J. Turina, and G.E. Seely, GCA Corporation, Bedford, Massachusetts, September 1983. <u>Characterization of Hazardous Waste Sites--A Methods Manual, Volume II: Available Sampling Methods</u>, EPA-600/4-83-040, U.S. Environmental Protection Agency, Environmental Monitoring Systems Laboratory, Las Vegas, Nevada.

U.S. Environmental Protection Agency, November 1986. <u>Test Methods for Evaluating Solid Waste, Volume II: Field Manual, Chemical/Physical Methods</u>, SW-846, Office of Solid Waste and Emergency Response, Washington, D.C.